



## U-Build It Enclosure Guide

### UB4755

Horizontal Format  
Dual 12"+ Compression Driver  
system

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Network Schematic

Components and  
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### UB4770

Vertical Format  
Dual 15" + Compression Driver  
System

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### UBSUB

Dual 18"  
Add-on Subwoofer  
System

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Construction Drawings

Components and  
Connections

# JBL Professional Enclosure Guide

## 1. Introduction

JBL components are known worldwide as the best money can buy. This guide contains construction details, filter network schematics and connection diagrams for enclosure designs using some of the most popular of those components, the 2206H, 2226H, 2242H, 2447J and 2404H. These enclosures are based on popular JBL systems, but have been modified for ease of construction for the intermediate level woodworker. By following the instructions herein you can build your own system to perform as well some of JBL's best designs.

### 1.1. Cabinet construction

Material should be 19 mm, 13 ply void free plywood for general purpose portable applications or high grade MDF board for less portable applications

Ducts can be made of PVC pipe or hard cardboard tubes such as those found in carpet rolls.

Joints should be glued and screwed. Care should be taken to ensure tight joinery in order to make the enclosure airtight.

Handles and connector plates must be made airtight. Silicone cement can be used here and in corners to seal the enclosure.

Interior of box should be lined with damping material, such as fiberglass insulation, to reduce internal standing waves. Be sure to keep port openings free of material as blockage will decrease their effectiveness.

Drivers are mounted on the front of the baffle using screws and T-nuts in the baffle. This allows easy access to interior to adjust damping and easy driver replacement.

### 1.2 .Construction Tips

Everything is built around the baffle. The baffle rests in dado (groove) in each of the two sides and top and bottom panels.

Install T-nuts for Drivers and Horns prior to assembly.

The Top and bottoms panels fit OVER the side panels.

Install the back panel LAST. This will allow access to the interior for placement of damping material.

Dry fit all parts before final construction.

## 2. The full range systems : UB4755 and UB4770

### 2.0. Introduction

The UB4755 and UB4770 are 2-way 12" or 15" woofer and HF compression driver designs with the option of adding two super tweeters, for 3-way systems. The 12" version is a horizontal format for low profile single unit use and the 15" is an "arrayable" trapezoidal design for use where multiple units are to be used together to form a larger system.

The components used are as follows :

**Table 1. Components used for UB4755 and UB4770**

<b>Name / Description</b>	<b>Configuration</b>	<b>LF</b>	<b>MF</b>	<b>Horn</b>	<b>VHF</b>
UB4755 Dual 12" with driver	2-way	(2) 2206H	2446J	2380A	-
UB4755 Dual 12" with driver and tweeters	3-way	(2) 2206H	2446J	2380A	(2) 2404H
UB4770 Dual 15" with driver	2-way	(2) 2226H	2446J	2380A	-
UB4770 Dual 15" with driver and tweeters	3-way	(2) 2226H	2446J	2380A	(2) 2404H

### 2.1. Connection

Two 8-pin Neutrik Speakon connectors are specified so that you may loop through to another cabinet (note that that will get you a 2 ohm load) or a subwoofer. **DO NOT CONNECT MORE THAN TWO CABINETS IN PARALLEL.** Do not use series wiring.

**Table 2 Connector Pin Assignments**

	<b>Passive</b>	<b>Active</b>
Pin #s	Use	Use
+4,-4	not used	VHF (2x2404H Super tweeters, optional)
+3,-3	not used	HF, 2446J compression driver
+2,-2	full range	LF, 2x2206H or 2x2226H
+1,-1	not used or loop through for subwoofer	not used or loop through for subwoofer

### 2.2 Amplifiers

The following amplifiers should be used :

**Table 3 Amplifiers for each Passband**

	<b>Passive</b>	<b>Active</b>
Pin #s	Amplifier	Amplifier
+4,-4	unused	JBL MPA275, 275W per channel at 4 ohms (optional)
+3,-3	unused	JBL MPX600, 600W per channel at 4 ohms
+2,-2	JBL MPX1200, 1200W per channel at 4 ohms	JBL MPX1200, 1200W per channel at 4 ohms
+1,-1	unused	unused

The amplifiers should be driven clean, that is, without clipping. At the most, clip lights should just turn on during occasional programme peaks.

Note : In two-way active mode, you may use an MPA1100 amplifier for the low frequency and make use of the IM-10 input crossover module. See the crossover section below.

### 2.3. Crossover

For the passive version, a passive crossover is built-in. For the active versions, a JBL M552 or M553 should be used. The table below details what x-over model, how many units will be needed for a stereo system and what crossover frequencies should be used. Note that you should assign 2380 series horn EQ to the 2446J MF compression driver. Make sure that :

- it is set for 2380 equalization
- It is assigned to the outputs that will drive the compression driver.

The manual for the M552 or M553 contains specific information on how to make the proper settings.

An alternative to using an external crossover in two way active mode with the UB4755 or UB4770 is to use an IM-10 input crossover module and an MPA1100 amplifier for the low frequencies, instead of an M552 and an MPX1200 amplifier. This will provide a more compact system that cannot be modified externally and therefore provides protection against unauthorized alteration. Horn equalization for the 2380 series of horns is also provided in the module and should be engaged.

**Table 4 Optimum Crossover Frequencies and Equipment Options**

<b>Name</b>	<b>Description</b>	<b>Configuration</b>	<b>X-over model / mode</b>	<b>Number (stereo)</b>	<b>X-over frequencies</b>
UB4755 or UB4770	Dual 12/15" with driver	2-way active	M552 / stereo 2-way mode	1	1200 Hz, engage 2380 EQ for MF
UB4755 or UB4770	Dual 12/15" with driver	2-way active	IM-10 input module for MPA1100 amplifier	1	1200 Hz, engage 2380 EQ for MF
UB4755 or UB4770	Dual 12/15" with driver and tweeters	3-way active	M553 / stereo 3-way mode	1	1200 Hz, 7k Hz, engage 2380 EQ for MF

Note that you will need to balance the output for each of the frequency bands in relation to the others.

### 3. The Subwoofer system : UBSUB

#### 3.0. Introduction

The UBSUB is a dual 18" system that utilizes the highest output 18" cone bass transducer currently available from any manufacturer, the 2242H. The 2242H is designed for smaller enclosures and to provide a more "punchy" or "faster" low frequency response required for live sound and dance club PA applications.

#### 3.1. Connection

Two 8-pin Neutrik Speakon connectors are specified so that you may loop through to full range cabinets or another subwoofers (note that that will get you a 2 ohm load). DO NOT CONNECT MORE THAN ONE CABINET TO THE AMPLIFIER. Do not use series wiring.

**Table 5 Connector Pin Assignments for UBSUB**

	Active
Pin #s	Use
+4,-4	not used or loop through for full range cabinets
+3,-3	not used or loop through for full range cabinets
+2,-2	not used or loop through for full range cabinets
+1,-1	Subwoofer, 2x2242H

Note: 4-pin Neutrik Speakon connectors can also be used provided that you will be using the full range systems in passive mode. In that case keep the pin number the same (+2,-2) and use (+1,-1) for looping through to the subwoofer if you have it.

#### 3.2. Amplifiers

The following amplifiers should be used :

**Table 6 Amplifiers for UBSUB**

	Active
Pin #s	Amplifier
+4,-4	unused
+3,-3	unused
+2,-2	unused
+1,-1	JBL MPX1200, 2400W in bridge mode at 4 ohms

Note that the amplifier is used in bridge mode, so that only one dual 18" cabinet maybe connected to one amplifier. Using the MPX1200 in bridge mode also means it has more input gain, so you should turn the subwoofer output down to compensate.

The amplifier should be driven clean, that is, without clipping. At the most, clip lights should just turn on during occasional programme peaks.

### 3.3. Crossover

The subwoofer system does not have a passive crossover and NEEDS AN ACTIVE crossover. Do not wire it in parallel with a full-range system as this only rob power from both resulting in poor sound quality.

JBL cross over models M552 or M553 should be used. The table below details what x-over model, how many units will be needed for a stereo system and what crossover frequencies should be used. Note that you should assign 2380 series horn EQ to the 2446J MF compression driver. Make sure that :

- a) it is set for 2380 equalization
- b) It is assigned to the outputs that will drive the compression driver.

The manual for the M552 or M553 contains specific information on how to perform make the settings.

**Table 7 Optimum Crossover Frequencies and Equipment Options**

<b>Description</b>	<b>Configuration</b>	<b>X-over model / mode</b>	<b>X-over frequencies</b>
UBSUB subwoofer + UB4755/4770 in passive version	2-way active	M552 / stereo 2-way mode	80-150 Hz
UBSUB subwoofer + UB4755/4770 with tweeters in passive version	2-way active	M552 / stereo 2-way mode	80-150 Hz
UBSUB subwoofer + UB4755/4770 in active version	3-way active	M553 / stereo 3-way mode	80-150 Hz, 1200 Hz, engage 2380 EQ for MF
UBSUB subwoofer + UB4755/4770 with tweeters in active version	4-way active	M553 / mono 4-way mode (2 units needed)	80-150 Hz, 1200 Hz, 7k Hz, engage 2380 EQ for MF

Note that you will need to balance the output for each of the frequency bands in relation to the others.

If your system allows it, is always good practice to introduce a high pass filter (sometimes referred as a subsonic filter) beyond the lowest frequency of operation. This will improve power handling by avoiding excessive cone excursion and will maximize system headroom. For a 4755 or 4770 use a high pass filter at 40 Hz. When using a 4755 or 4770 in conjunction with the UBSUB subwoofer, cut the subwoofer signal at 30 Hz (On the MPX series of amplifiers you can accomplish this by engaging the 30 Hz filter on the front of the amplifier).

Additionally, you may want to replace the M553 or M552 for the JBL DSC260 3-way stereo/6-way mono digital system controller that will provide programmable cross over, EQ, limiting and time alignment or delay.

## 4. Setting Up

Before setting up the system interconnection cables should be assembled. It is essential that all cabling use the proper type and size of wire and that termination is done correctly. This will give the best performance from the system by eliminating losses from poor or incorrect connection.

### 4.1 Polarity

One of the most important considerations in cables is that they are in correct polarity. “In polarity” refers to all signals moving in the same direction at the same time. Having cables improperly connected “out of polarity” can cause cancellations at certain frequencies thereby adversely affecting frequency response especially at low frequencies. This translates simply into making certain the “+” and “-” connections are consistent throughout the system. JBL speaker systems exhibit outward (“positive”) cone motion when a positive voltage is presented to the “+” terminal.

JBL electronics follow the Pin 2 “Hot” convention for wiring of XLR connectors.

### 4.1 Speaker Cable

Use the correct thickness for the impedance you will be driving and length of cable you will be running. Longer runs require thicker cable. Lower impedances also require thicker cables. The table below gives the maximum length of cable to be used for a given speaker load. For the best performance from your system these tables should be referenced for your choice of speaker cable.

**Table 8 Maximum Cable Length (m) for Gauge of Wire and Speaker Impedance**

<b>Gauge</b>	<b>Area mm<sup>2</sup></b>	<b>2 Ohm</b>	<b>4 Ohm</b>	<b>8 ohm</b>	<b>16 ohm</b>
10	5.26	18	36	72	144
12	3.31	11	23	45	90
14	2.08	8	15	30	60
16	1.31	5	9	18	36
18	.82	3	6	12	24
20	.52	2	4	8	16

### 4.2 Taking it further

For optimal fine tuning of your system we suggest the JBL SMAART PRO Software. SMAART PRO is a full function FFT( **F**ast **F**ourier **T**ransform) measurement tool which allows the user to readily see where frequency response may need adjusting. The software can be used during a performance and only requires a PC, microphone, and mixer.

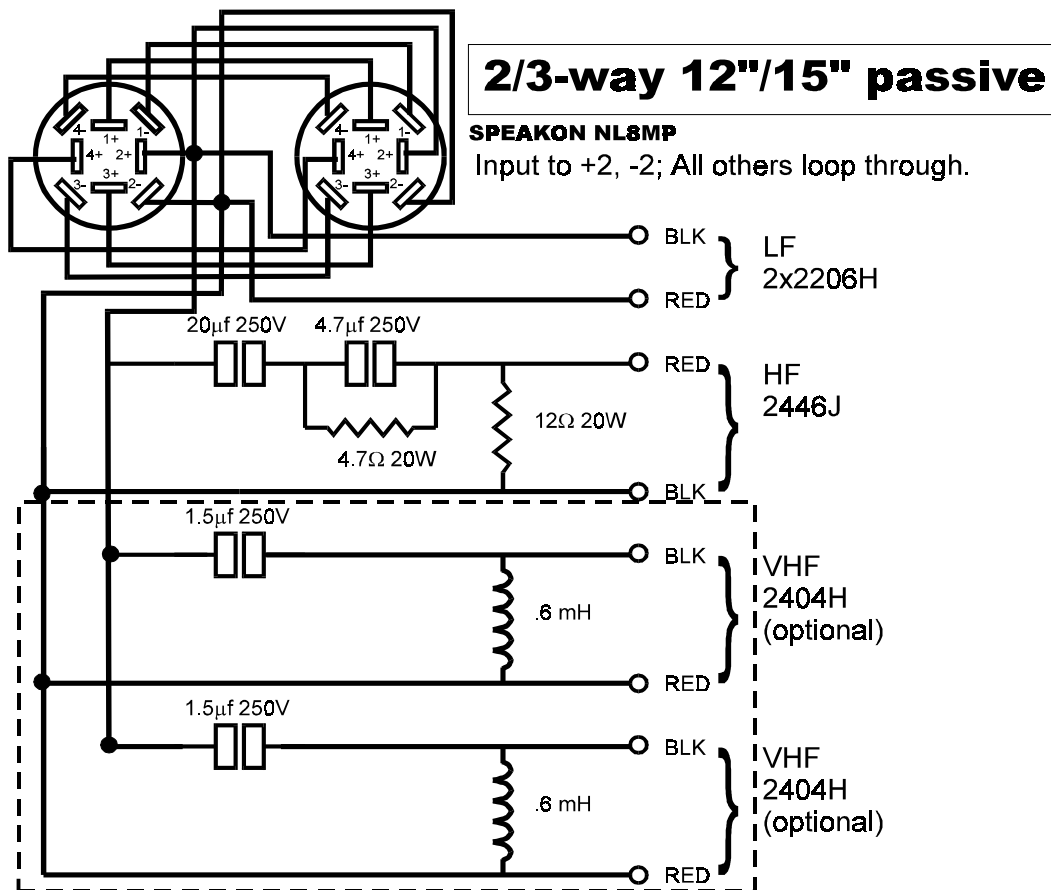
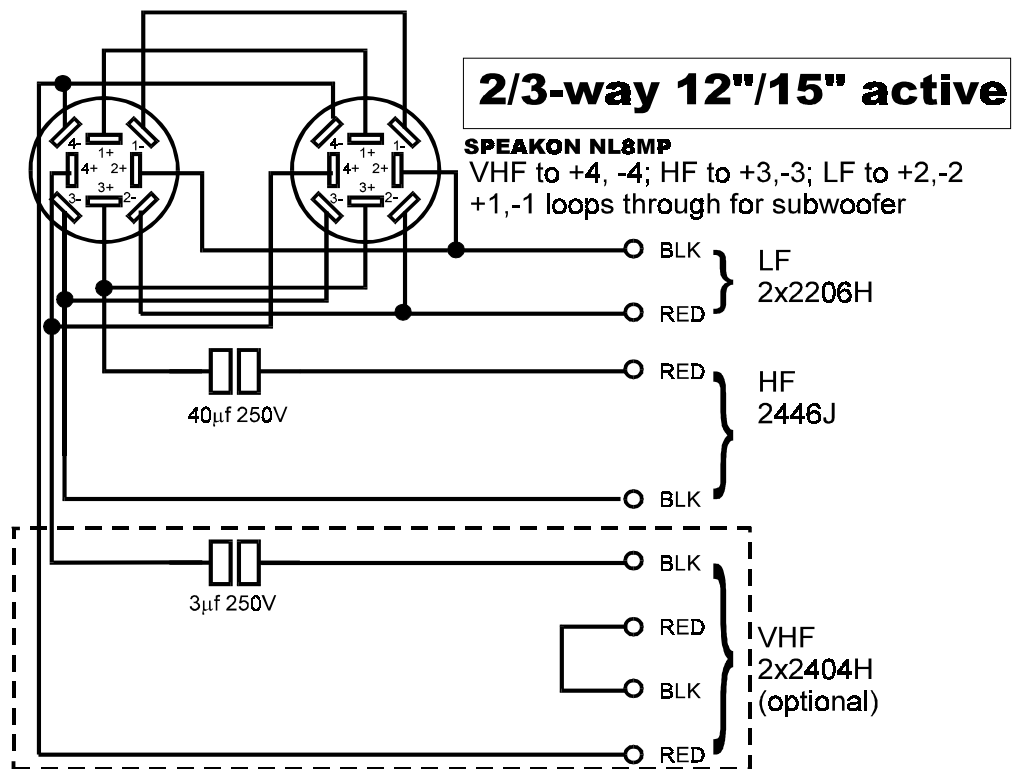
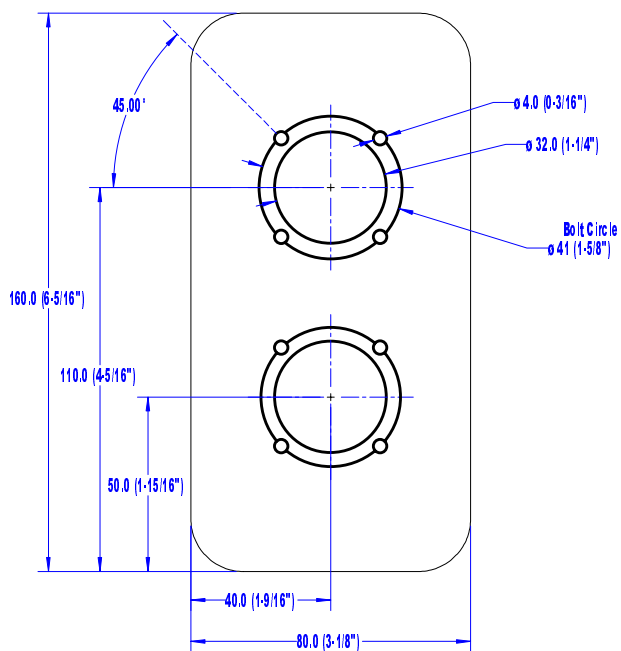
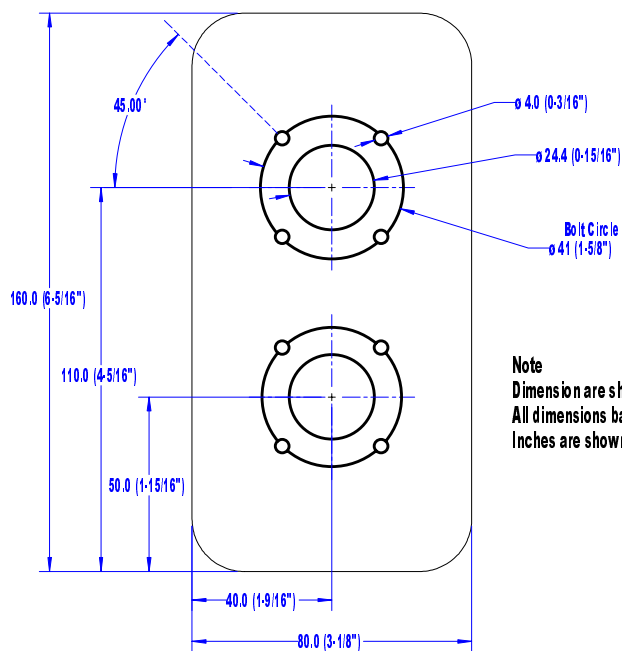


Figure 1 Network Schematics





**Connector Panel**  
**8 Pin Neutrik Speakon**  
 Use Part No. NL8MPR



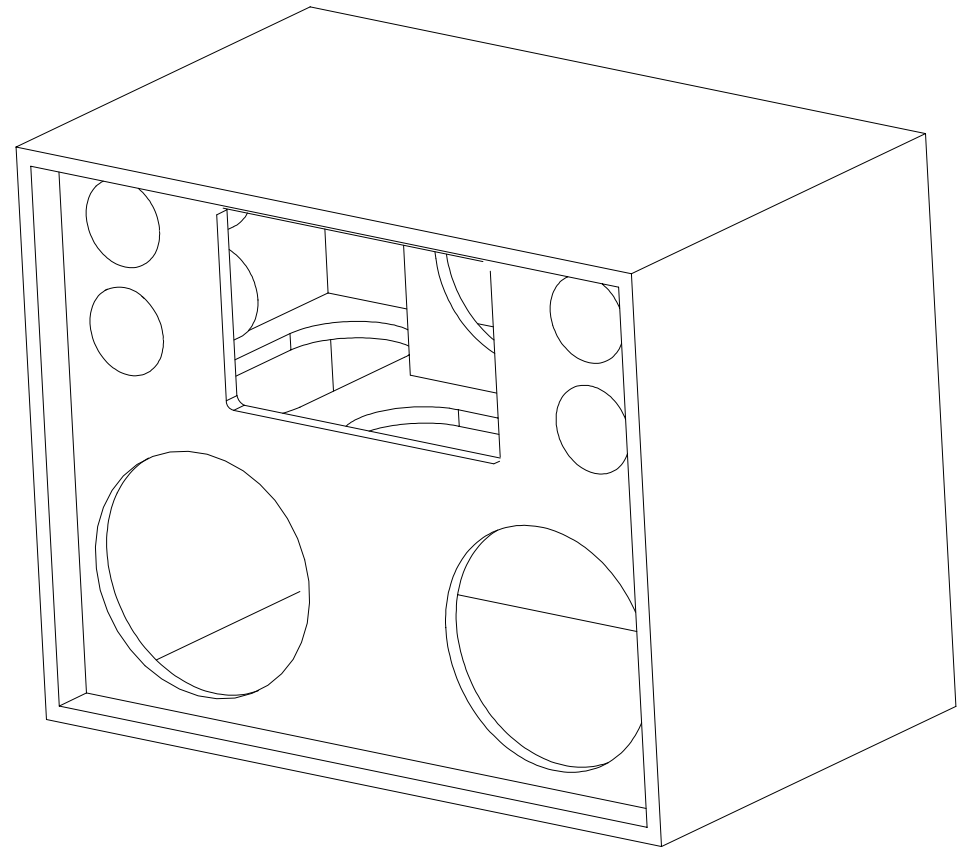
**Connector Panel**  
**4 Pin Neutrik Speakon**  
 Use Part No. NL4MPR

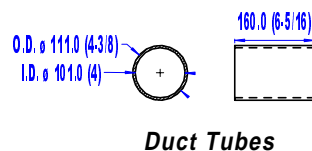
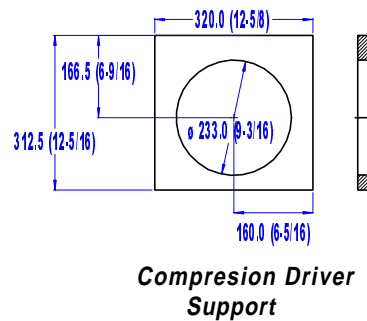
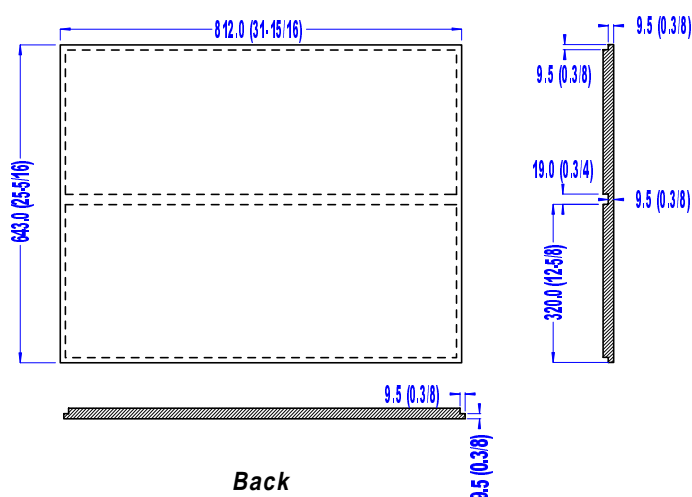
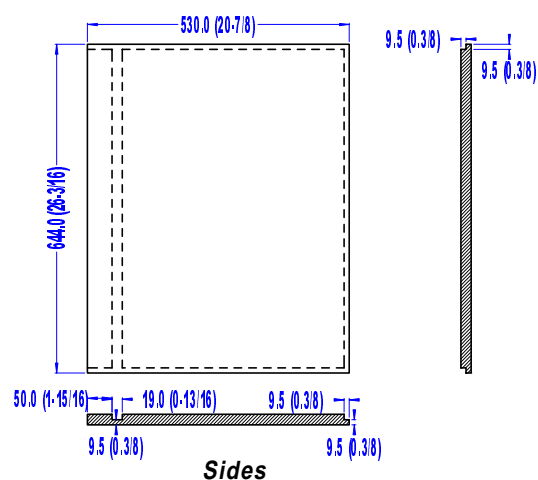
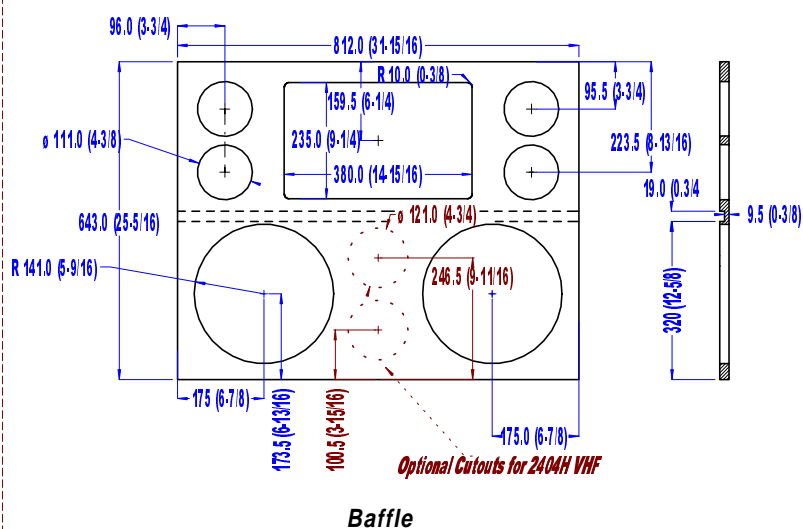
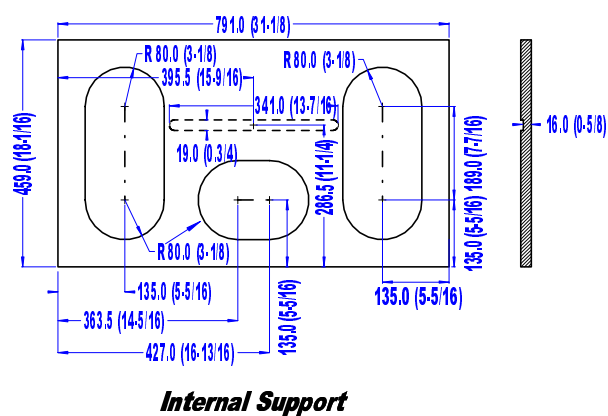
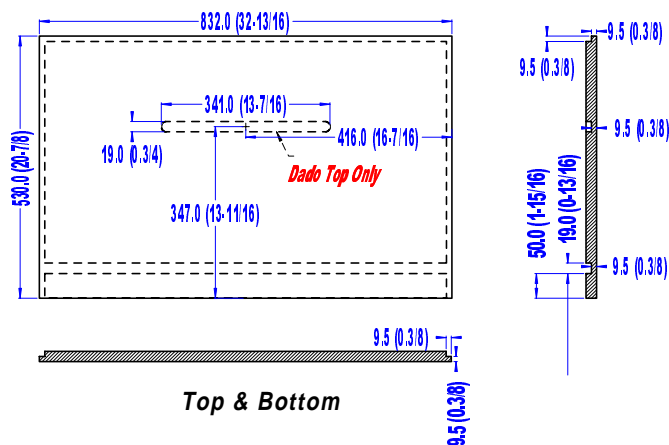
**Note**  
 Dimension are shown as: mm(inches)  
 All dimensions based on metric measurements.  
 Inches are shown for reference only.

**Figure 2 Suggested Connector Panel Layouts**

# UB4755 Performance Specifications

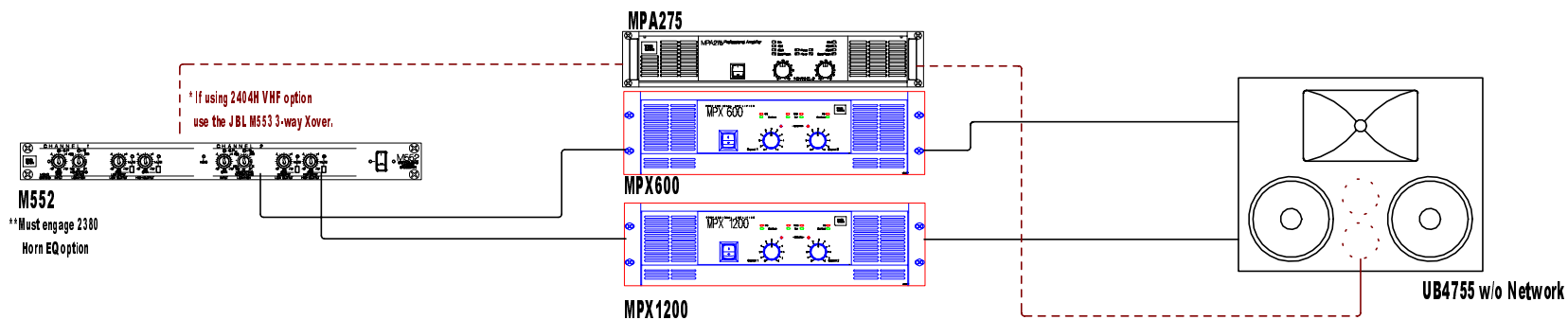
<b>LF Components</b>	<b>2206H (2)</b>
<b>HF Components</b>	<b>2446J w/ 2380A</b>
<b>Sensitivity</b>	<b>198 dB SPL</b>
<b>Power Handling</b>	<b>1200 W LF, 150 W HF</b>
<b>Max Peak SPL</b>	<b>135 dB</b>
<b>Frequency Response</b>	<b>55 - 18k Hz</b>





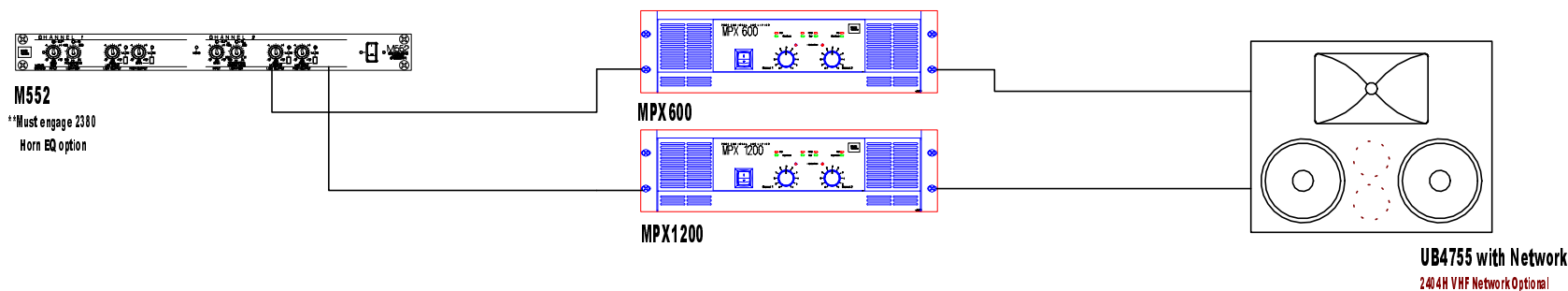
**\*Note:**  
 Dimensions are shown as: mm (inches)  
 All dimensions are based on metric measurements.  
 Some dimensions may need slight adjustment if  
 measured in inches.

Xover Freq:  
LF/HF 800 - 1200 Hz  
HF/VHF 7kHz



## UB4755 Active 2 way (3-way optional) Configuration

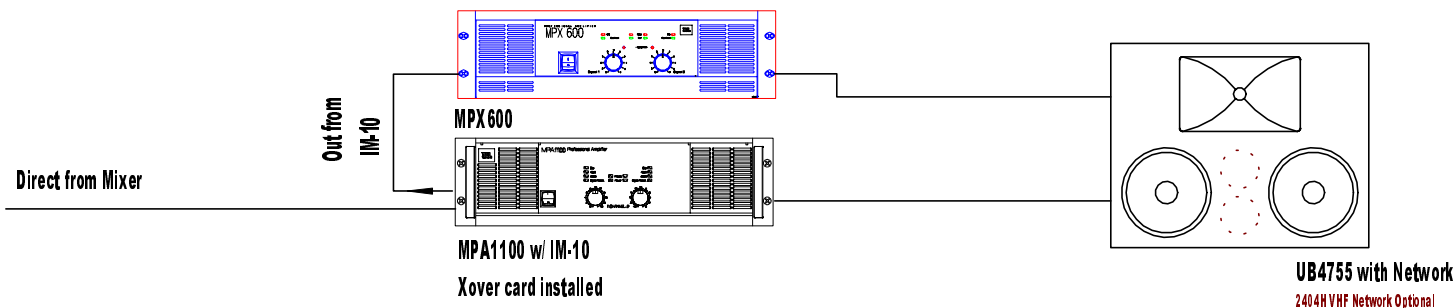
Xover Freq:  
LF/HF 800 - 1200 Hz



## UB4755 w/ Passive HF (Optional VHF) Network Option 1

Xover Freq:  
LF/HF 800 or 1200 Hz

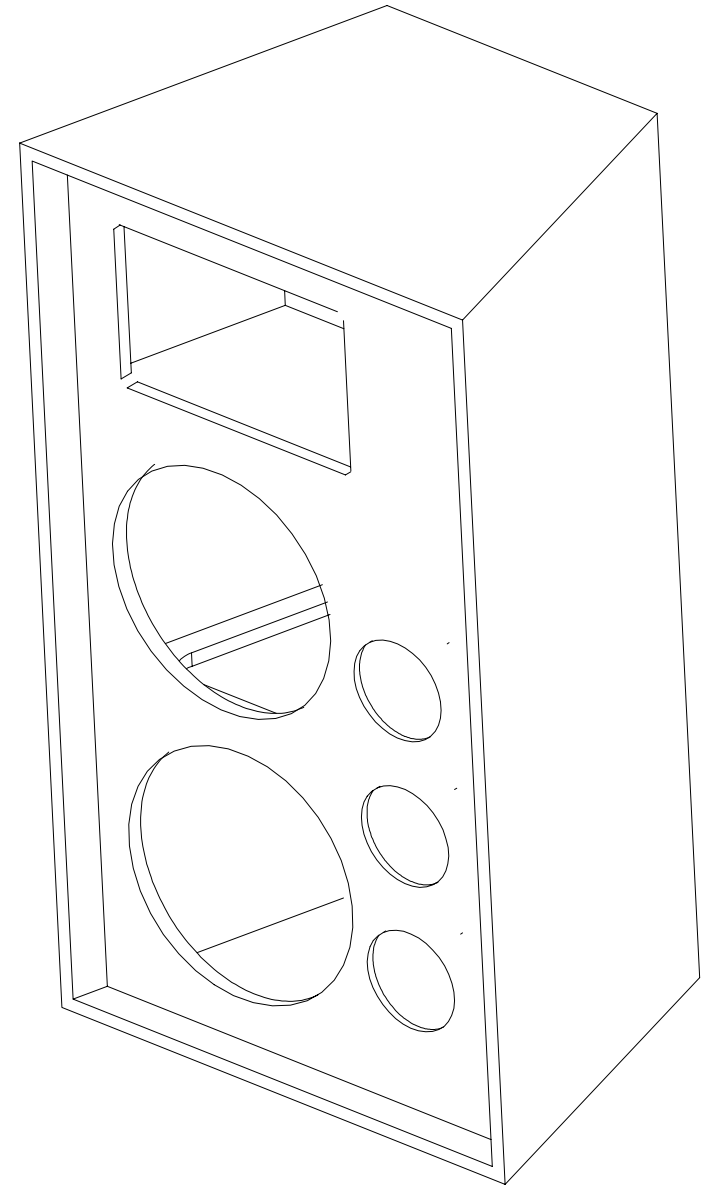
\* This option can also be used for Active 2-way operation. IM-10 includes 2380 Horn EQ.

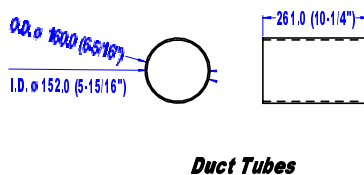
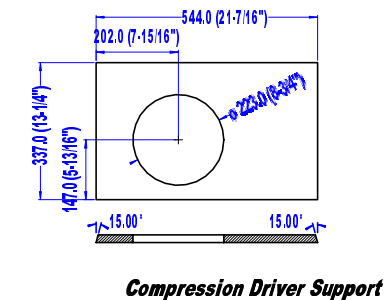
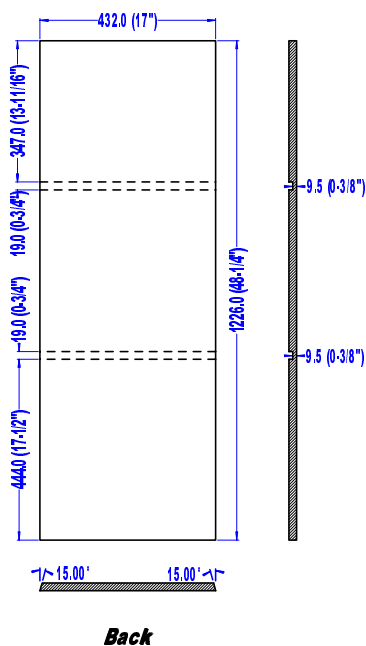
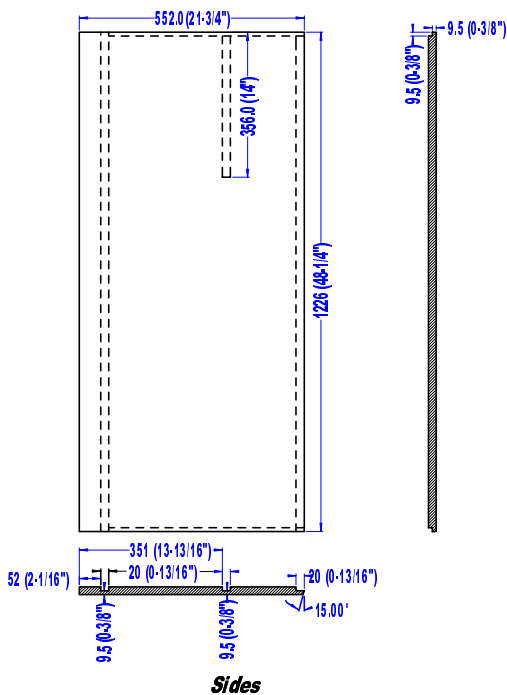
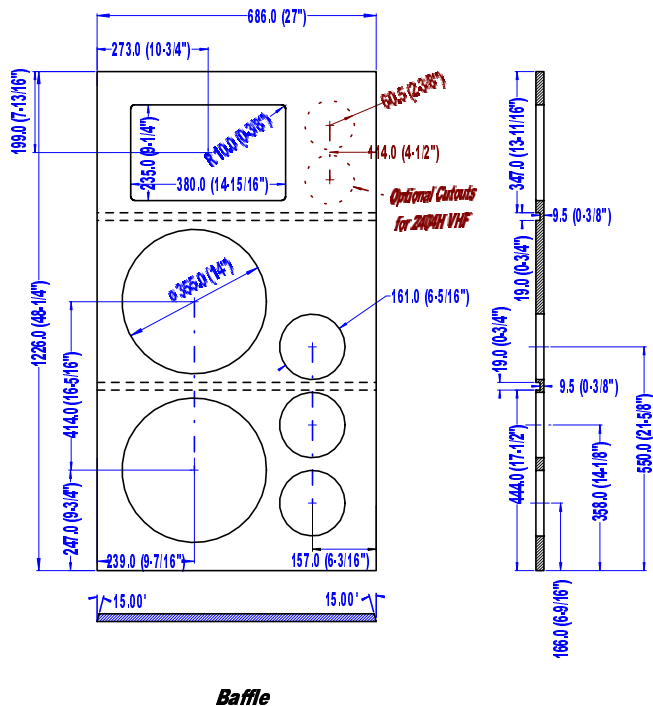
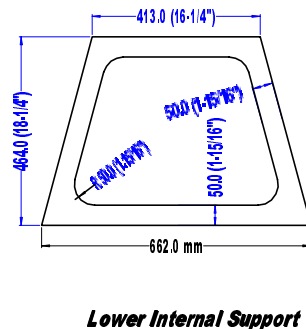
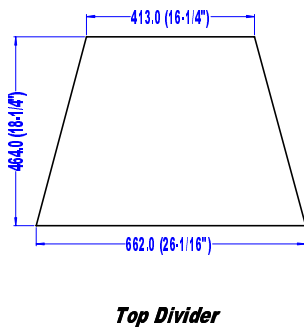
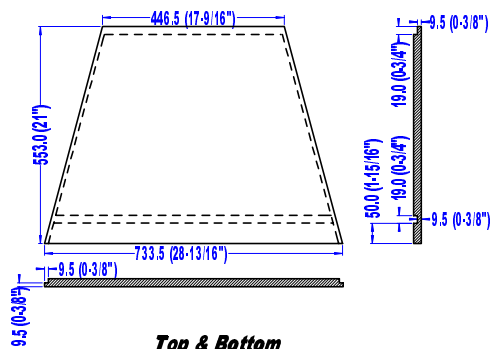


## UB4755 w/ Passive HF (Optional VHF) Network Option 2

# UB4770 Performance Specifications

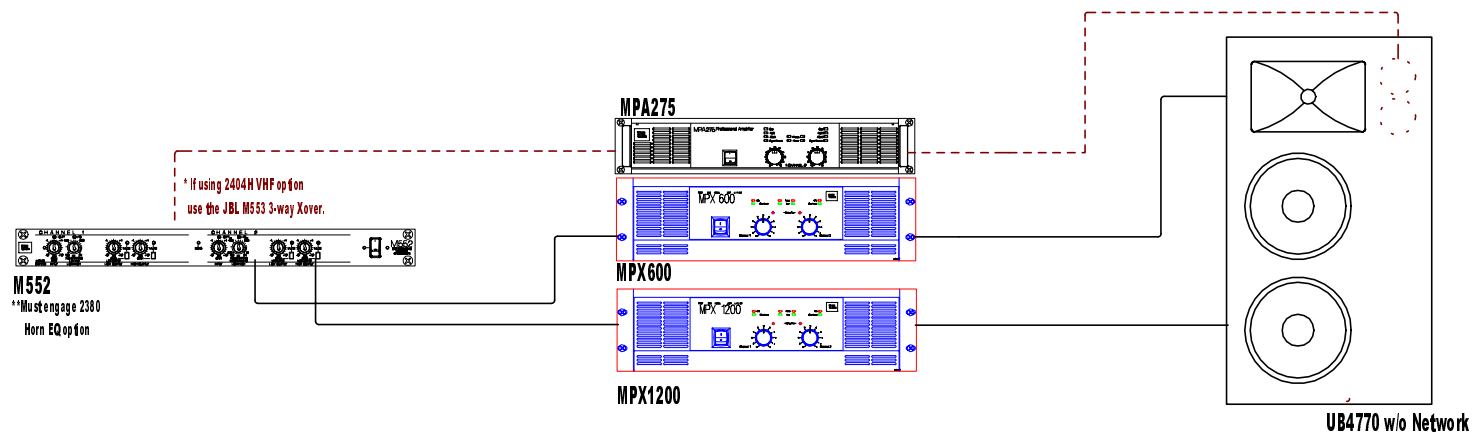
<b>LF Components</b>	<b>2226H (2)</b>
<b>HF Components</b>	<b>2446J w/ 2380A</b>
<b>Sensitivity</b>	<b>100 dB SPL</b>
<b>Power Handling</b>	<b>1200 W LF, 150 W HF</b>
<b>Max Peak SPL</b>	<b>137 dB</b>
<b>Frequency Response</b>	<b>40 - 18k Hz</b>





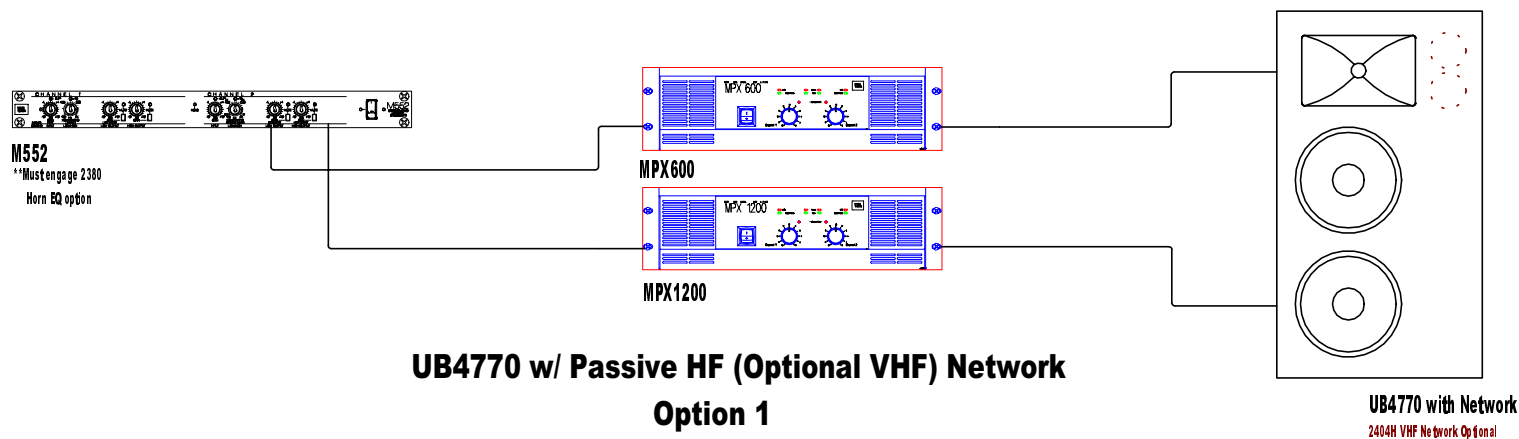
\*Note:  
Dimensions are shown as: mm (inches)  
All dimensions are based on metric measurements.  
Some dimensions may need slight adjustment if  
measured in inches.

Xover Freq:  
 LF/HF 800 Hz  
 HF/VHF 7kHz



**UB4770 Active 2 way (3-way optional) Configuration**

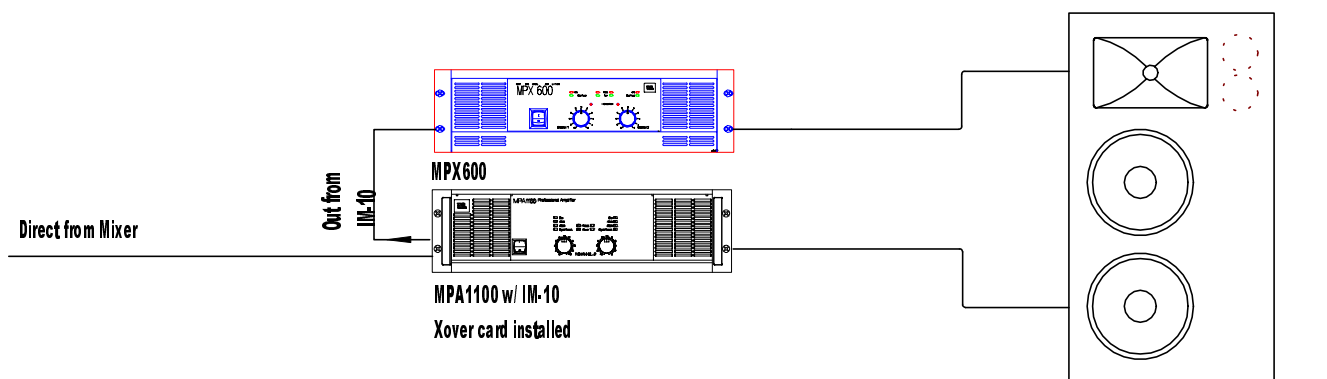
Xover Freq:  
 LF/HF 800 Hz



**UB4770 w/ Passive HF (Optional VHF) Network  
Option 1**

Xover Freq:  
 LF/HF 800 Hz

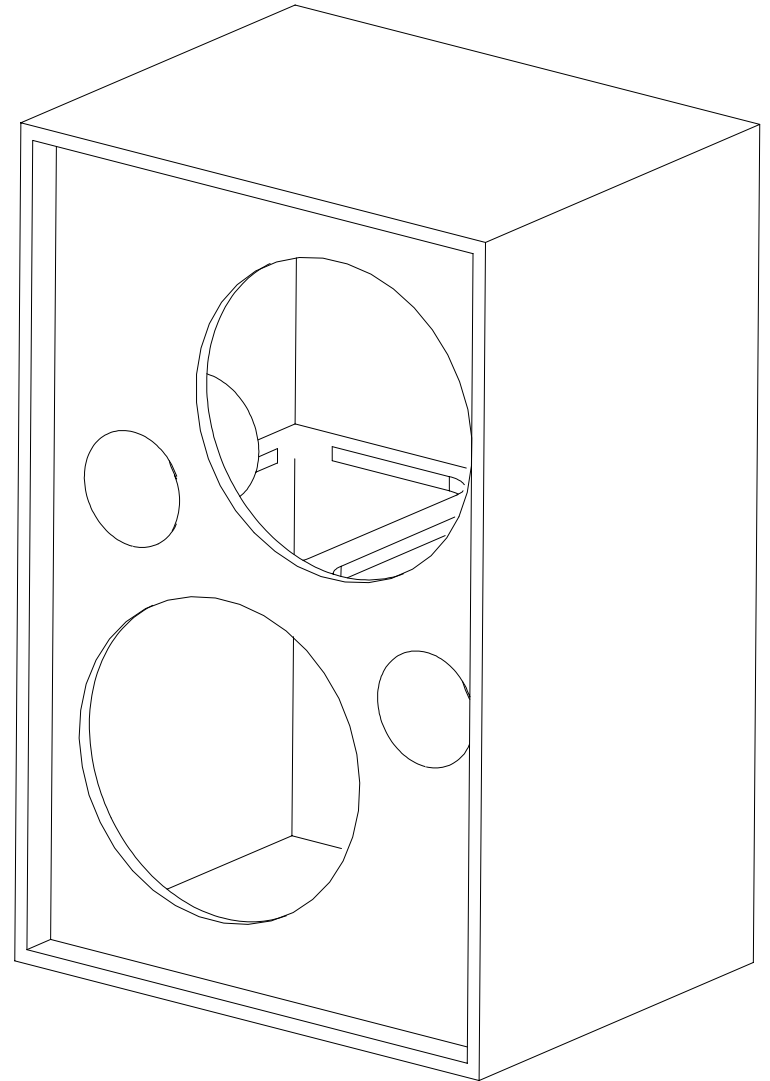
\* This option can also be used for  
 Active 2-way operation. IM-10  
 includes 2380 Horn EQ.



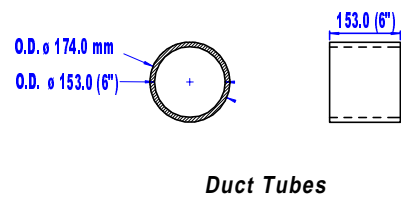
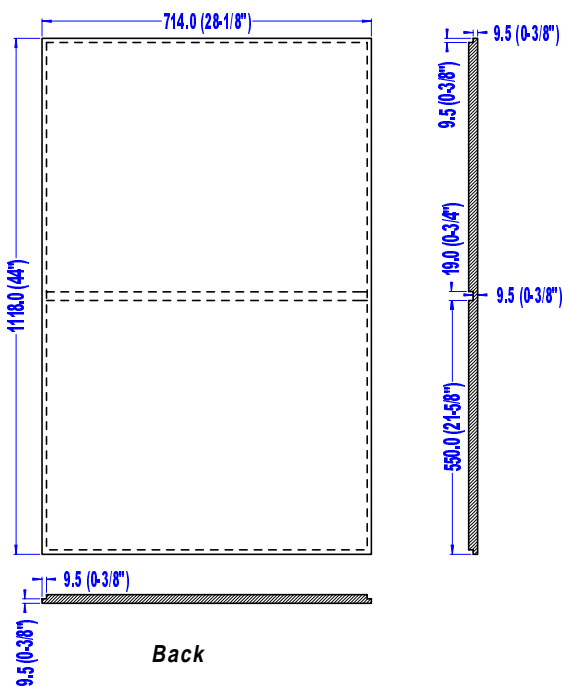
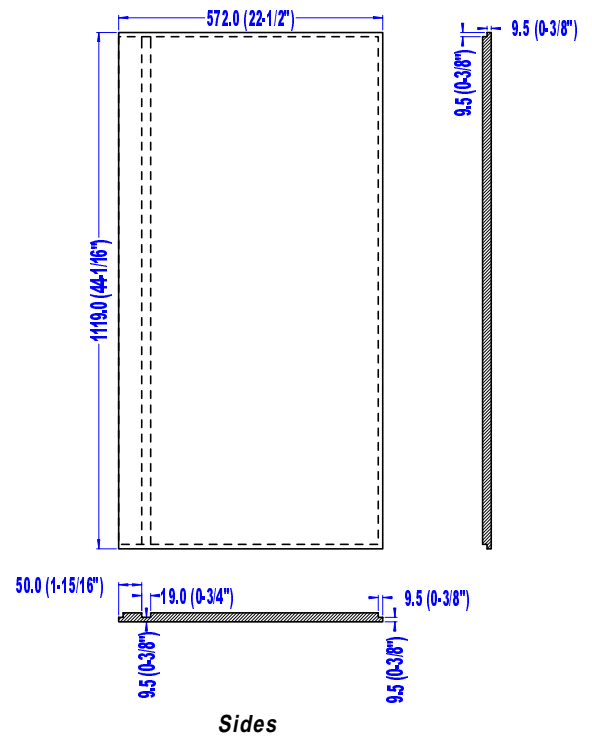
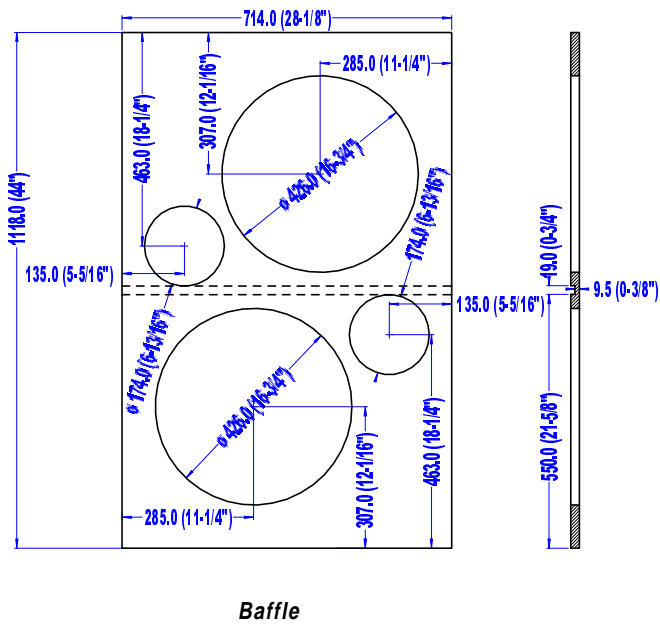
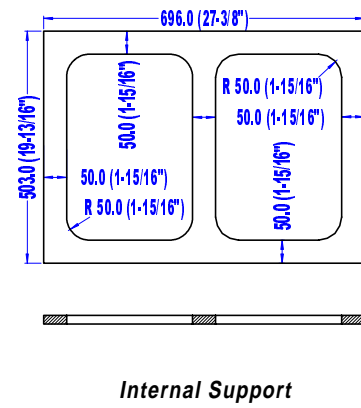
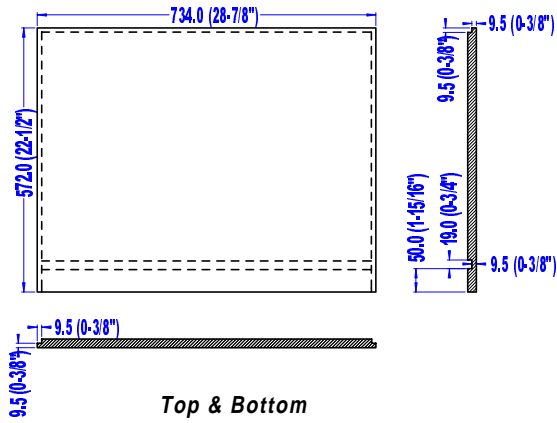
**UB4770 w/ Passive HF (Optional VHF) Network  
Option 2**

# UBSUB Performance Specifications

<b>LF Components</b>	<b>2242H (2)</b>
<b>Sensitivity</b>	<b>102 dB SPL</b>
<b>Power Handling</b>	<b>1600 W LF</b>
<b>Max Peak SPL</b>	<b>140 dB</b>
<b>Frequency Response</b>	<b>30 - 200 Hz</b>







**\*Note:**  
 Dimensions are shown as: mm (inches)  
 All dimensions are based on metric measurements.  
 Some dimensions may need slight adjustment if  
 measured in inches.

Xover Freq:  
Subsonic Filter 30 Hz  
VLF/LF 80-150 Hz

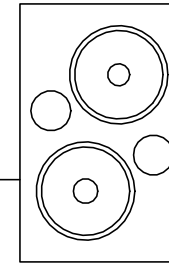
M553



Outputs to Full Range System  
e.g. UB4755 Passive Option 2  
or  
UB4770 Passive Option 2



MPX1200 Bridged mode

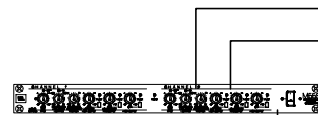


UBSub

### Subwoofer Add-on Option 1

Xover Freq:  
Subsonic Filter 30 Hz  
VLF/LF 80-150 Hz

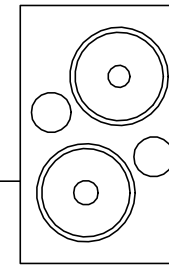
M553



Outputs to 2-way Full Range System  
e.g. UB4755 Passive Option 1  
or  
UB4770 Passive Option 1



MPX1200 Bridged mode

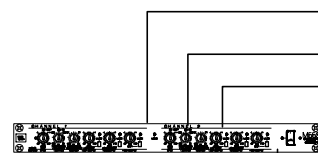


UBSub

### Subwoofer Add-on Option 2

Xover Freq:  
Subsonic Filter 30 Hz  
VLF/LF 80-150 Hz

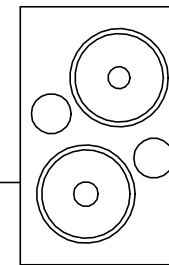
M553 Mono Mode



Outputs to 3-way Full Range System  
e.g. UB4755 Active w/ Optional VHF  
or  
UB4770 Active w/Optional VHF



MPX1200 Bridged mode



UBSub

### Subwoofer Add-on Option 3